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THE
PREVENTIVE TREATMENT
OF
CALCULOUS DISEASE
—
THOMPSON

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PREVENTIVE TREATMENT
OF
CALCULOUS DISEASE
AND
THE USE OF SOLVENT REMEDIES

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BY

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PREFACE.

I HAVE lately received so many communications in the form of inquiry and of suggestion, in relation to the two subjects named in the title, that I have decided on publishing the following Lectures, given at University College Hospital, as the simplest mode of furnishing a brief, but tolerably complete, reply in the present state of our knowledge.

35, WIMPOLE STREET,
April, 1873.

THE
PREVENTIVE TREATMENT
OF
CALCULOUS DISEASE.

LECTURE I.

EARLY HISTORY OF CALCULOUS DISEASE, AND
THE TREATMENT BEST ADAPTED FOR ITS
PREVENTION.

GENTLEMEN,—We have recently studied together and discussed very fully the various operations which are practised for the removal of stone from the bladder, and you have had the opportunity of seeing them performed many times, not less than eleven cases having passed through my wards during the last few weeks, each one with a successful result.

But, satisfactory as this is, it suggests very strongly to my mind that there remains an

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important question for us to consider ; as important, indeed, as any of the preceding subjects, and one which must naturally arise in all thinking minds. It is this : Is there not a period anterior to the stage of the malady already examined—a time at which we might prevent the formation of stone in the bladder, and so get rid of the necessity for removing it ? Admirable as the results of operative means have been—perfect (one may almost say) as they have become, at all events so far as regards the crushing operation—great as is the triumph which surgery has achieved in removing stone from the bladder—I take it there are very few men who would desire, if they could help it, to exhibit that triumph in their own persons ; and who would not be infinitely better pleased if we could succeed in preventing the formation of stone, instead of only achieving its removal, however satisfactorily the operation for that purpose might be performed. This, then, leads me to the consideration of an important question,—Can we do anything to prevent the formation of stone

in the urinary passages? It is, in fact, the earliest stage of this malady that will be the subject of our lecture to-day.

I commence by saying that I think a great deal may be done. But at the outset of the inquiry we naturally ask, What is the kind of stone (for there are several kinds) the formation of which we may hope to do most in preventing? All calculi are either of local or of constitutional origin. By "local," I mean formed by disease in the bladder itself, and not depending upon any constitutional conditions; by "constitutional," I mean formed by some vicious action, some error of assimilation inherent in the system. Now, the large majority of stones are of constitutional, and not of local origin. When they are local, you know that we cannot prevent their formation except by mechanical means. Calculous matter, the elements of which are produced in the bladder, may be washed out, or be broken or dissolved and then washed out. But when stones are of constitutional origin—and we are going to refer entirely to these to-day—

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their elements are separated from the blood, and no mechanical mode of preventing their production can by any possibility be available.

Now, from observation, we know that nineteen out of twenty of such stones have uric acid for their basis, the remaining one in twenty being oxalate of lime;* and, less commonly still, there are phosphatic stones which are of constitutional origin also. Therefore, practically, to all intents and purposes, the problem before us is contained in the question:—How may we best prevent the formation of uric-acid calculus?

Let us examine the early history of a case of persisting uric-acid deposit. First of all, let me say, going back to the root of the matter, that it is generally more or less hereditary. As an illustration on the spot let me recall the man we have just seen with uric-acid calculus in the ward, of whom we learned that his

* The deposits of oxalate of lime and of uric acid so often replace each other that the consideration of the latter becomes practically generally sufficient for our purpose.

father had "gravel or stone for the last twenty years of his life." And my almost invariable experience is, that either calculus or gout, more commonly the latter, has been observed in the family of the patient who comes to me with one of these formations in his bladder. I believe it, then, to be very strongly hereditary. We speak of tubercular disease and of cancer as being transmitted by blood relationship, especially the former; but I doubt if it is so certainly hereditary as the disposition to uric-acid deposits in one form or another. I make a point of asking the question of all patients who come to me with this complaint; and although I cannot at present furnish you with an exact numerical statement, I do know that in a very large majority either gravel or gout (for I wish to show you the identity as to the origin of these two complaints) has existed in the preceding generation; indeed, it is rare to find it otherwise. This hereditary tendency varies in force or strength in different families. You will find some persons with persisting uric-acid deposits at thirty

years of age or sooner, others at forty, others at sixty. Of course, the earlier the time at which it appears, the stronger you will infer the hereditary disposition to be, and the more obstinate, probably, will be its tendency to persist.

What, then, are the first signs of this condition in the patient? Usually, the first sign is that the urine deposits pinkish matter, on cooling, at the bottom of the vessel, or that the secretion has merely become cloudy when cold. Sometimes, too, a delicate film or pellicle covers the surface, which reflects faintly prismatic colours. It has been passed quite clear, becoming cloudy only when it acquires the ordinary surrounding temperature. This phenomenon, therefore, may appear more frequently in winter than in summer, because the external temperature is lower. It is simply a deposit of salts from a hot solution as the liquid grows cooler, all being easily dissolved by raising the temperature of the liquid to that at which it was originally passed. This is a condition of urine which very often

and very unnecessarily excites much anxiety on the part of the patients, and only the persistence of which can be looked upon as a sign of what is called "the uric-acid diathesis." Mind, I mean strictly persistence, or at all events frequency of occurrence: for you or I with no hereditary predisposition, may take a little more beer than usual, or an extra glass of champagne, or a glass or two of unaccustomed port, and find next morning a considerable quantity of this pinkish deposit, the urine looking almost like pea-soup, but not so thick, or like a mixture of rhubarb and magnesia; and when the vessel is tilted on one side, a tidal mark, so to speak, is seen, showing the height at which the liquid stood; all this, as I said before, being redissolved by heat. The opacity of the liquid, as well as its tint, which may vary from fawn to dull red, are due to the rapid production of the mixed urates; that is, urates of soda, potash, lime, &c. But if, without any errors of diet, of which any but a very small allowance of alcoholic drink is only one, a patient habitually

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passes this kind of urine—if in time there arrives also a frequent deposit of uric-acid, manifested by the presence of little crystals looking like particles of cayenne pepper at the bottom of the vessel—when this occurs rather early in life, say before forty, we cannot doubt that there is a strong tendency to produce uric-acid, either inherited or acquired. For this tendency may to a certain extent be acquired, or a pre-existing habit may be intensified ; but, as I have before said, it is almost always inherited. I now show you a specimen of urine quite cloudy with mixed urates, although you must be familiar with it in the wards, and also with the fact that on heating the liquid it again becomes clear, and that in a short time, while we are talking, it again becomes cloudy on cooling. Let me once more remind you that this may happen with the most healthy individual ; and it is only the persistence of the symptom, without errors of diet, which should lead you to suspect a condition that requires treatment.

We have followed the complaint up to the

formation of cayenne-pepper crystals. Of this deposit I have some very good specimens here, which have been collected from patients who passed it habitually. These consist mainly of the transparent rhomboidal uric-acid crystals—which you know to be very beautiful objects under the microscope. They may be passed almost daily and habitually by some persons ; while others will do so only every few weeks, but then in large quantity, which usually produces a good deal of irritation. At such periods the patient may experience pains in the back and great discomfort, and he may then be said to have an attack of sand or gravel. These attacks occur at varying intervals, and usually become more frequent or severe, unless the patient does something to prevent their occurrence. Afterwards he passes tiny calculi, popularly called “gravel,” which seem to be rounded or irregular aggregations of the same crystals ; and these little bodies tend in time to become larger, sometimes as large as small peas, or even beans ; and they are still specimens of

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the same product—that is, of uric acid, associated more or less with some alkaline base, such as those above named.

Now let me recall for one moment what I said as to the relation of gout to this condition. I have sometimes seen these two complaints alternating, comparing one generation with another: gout appearing in the one, gravel in the second, and then gout in the third. But the same individual may also have alternating attacks of gout and gravel. I have seen a patient suffering for years from gout, which ceased for several months, when he developed for the first time a uric-acid stone. Lastly, the so-called “chalk-stones,” which you have often seen infesting the knuckles and disfiguring the hands of elderly people in advanced stages of gout, are composed of the same material—that is, of uric acid, usually as urate of soda. The identity of the two things, then, is unquestionable ; they constitute two different series of phenomena, but both spring from one and the same root.

Now what is to be done for these cases ? What mode of treatment will help to pre-

vent the arrival of at least the advanced condition—namely, that of calculus too large to be voided by the patient? Generally speaking, I think such patients come under observation in a tolerably early stage, although this is by no means always the case. Some are much alarmed at a very early period, when the urine is only occasionally thick with urates. You will of course disabuse such patients of their false impressions, because numbers of persons mistake such thick urine for highly organized matter. I have known persons to become almost hypochondriac through not knowing that such deposits are of little consequence at first, and can be easily treated. But what are we to do for those who habitually pass the cayenne-pepper crystals of uric acid or small calculi? You will first seek the patient's antecedents, and learn all that he has to tell you of his habits, his diet, and his family history; and your mode of treatment will be determined accordingly. First of all, let me speak of the general principles upon which the treatment should be conducted. A very simple

rule—indeed, too simple, I think—is often adopted. When the urine has persistently and habitually thrown down acid deposits, the patient has generally been prescribed alkalies : if, on the contrary, he has had alkaline deposits, he has been treated with acids. That simple mode has too often formed the main portion of the treatment. In the former case he has soda or potash largely administered, or he will be told to drink so many glasses of Vichy water, which is mainly a strong solution of carbonate of soda, only it is a natural instead of an artificial one. Now it is quite true that with alkalies, provided enough be taken, these deposits will disappear ; the uric acid will no longer be deposited ; the urine will become less irritating ; the annoying symptoms will be diminished or got rid of. And of course the patient is very much pleased with this new condition of clear urine and disappearance of all deposit. And you will say, “ What more can be desired ? ” This : you have merely made his enemy disappear, but he is by no means rid of its presence : you have not checked

the acid formation. The uric acid is there as much as ever ; but the uric acid and the urates are soluble in alkali, and you have only made them invisible. You really have the same condition as that of the fabled ostrich, which is said to put its head in the bush when pursued by hunters, and, no longer seeing them, to believe itself secure. Just such is the security of the patient with uric acid who trusts solely to alkalies or Vichy water. His surplus deposits have become imperceptible to his vision ; nothing more. I do not say the alkalies have been absolutely unserviceable as regarding his constitutional state, but they will not improve it to any great extent ; and when he leaves them off the acid shows itself again. And further, I believe there is reason to conclude that large quantities of alkali habitually taken exercise an injurious influence on the viscera. Diuretics must be regarded in the same light. In those cases which are treated with diuretics, the secretion of water is no doubt increased *quoad* the amount of solids, and the solids are thus dissolved. In both instances what you

have chiefly done has been to stimulate the kidneys, already overworked, to do more. You have by no means cured the patient.

Now let us ask what is the real pathology of these cases, and then I think I shall be able to show you a more efficient remedy. The problem has presented itself to me with great force and frequency, because people, naturally fearing they may arrive at the stage of calculous formation, come for advice in the earliest stages, and with the strongest desire to avoid the advanced one of stone in the bladder. So far from its being desirable to send them to Vichy, or to give them alkalies, I believe such patients can be more effectually dealt with by a different mode of treatment. Let me premise in broad and simple terms—as our time here, and, I may perhaps add, the extent of our knowledge, will not permit me to be more minute or exact in detail—that the origin of what we call gouty symptoms, as well as of a superabundant uric-acid deposit in the urine, is due to defective assimilation on the part of organs associated with or forming the *primæ viæ*. I am quite aware that it

is common in practice to speak somewhat knowingly of the liver, its action, and its states, although we have still a good deal to learn about all this. Some years ago we talked and acted as if we were thoroughly acquainted with the liver and its functions; but during the last fifteen or twenty years new light has been thrown upon the subject by Bernard, Pavy, and other workers in the same field, and we have learned that the more we inquired the less did we certainly know of its natural functions, still less of its action in disease. Thus, if one thing was more settled than another, at least since the time of Abernethy, it was that mercury had a specific influence on that organ; but now we find that there may be grounds for believing that the action supposed has no existence at all. There were other things, indeed, which were vaunted to take the place of mercury, but no one ever thought of disputing the fact that you could augment at will the bile secretion by administering that famous drug. I am not here to say whether that is so or not, but it seems to have been proved that there are sub-

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stantial reasons for doubting if our ancient faith in that dogma be tenable. In speaking, then, of the "defective action of the liver," or of "torpor of the liver," I merely use provisional terms, which most will easily understand as indicating more or less distinctly a certain set of symptoms. Let them be briefly described as mainly consisting of a constant, or almost constant, deficient excreting function by the bowels, sometimes, but by no means always, associated with impaired appetite and slow or uneasy digestion ; these latter being often absent if the diet is carefully selected, or if the patient lives in the open air and takes much exercise. On the other hand, considerable and multiform symptoms of disturbed digestion may be frequently present. I cannot positively state whether those phenomena are really due to inactivity of the organ in question ; practically, for us to day, this does not signify much, but the current terms are still convenient formularies until better ones can be substituted for describing the condition in question.

Now, at the bottom of this tendency to

uric-acid production there often lies what is thus understood as inactivity of the liver ; and the true rationale of the unduly large formation of the urinary salts appears to be that, the liver or some allied organ not doing its duty as an excreting organ, the kidneys have more work than is natural thrown upon them. Thus the solid matters of the urine, or rather some of its ordinary constituents, are augmented,—not all of them, for urea is not necessarily increased, but uric acid is largely produced, and is eliminated not only in solution but in crystalline forms. Uric acid is very insoluble in water ; and although the quantity thrown out may be quite soluble at the natural temperature of the urine (100° Fahr.), when this diminishes to 60° , 50° , or 40° , the acid is deposited, and when the quantity becomes larger still, even the ordinary amount of fluid associated with it at a temperature of 100° will not suffice to dissolve the whole, and solid uric acid is deposited in some part of the urinary passages. This deposit may take place in the kidneys themselves, giving rise, if not thrown off, to the formation of calculus, at

first renal, but sooner or later mostly becoming vesical. Now, if all this be so, the formation of uric-acid gravel is not by any means to be regarded as necessarily disease of the kidney; on the contrary, it is the result of an active and capable organ vicariously relieving some other organ, the function of which is torpid. The true remedy, therefore, is not to stimulate the kidneys, already overworked—not, to use a familiar simile, to spur that horse of the team which is already doing too much work, but you are to seek the cause in that other one of the team which is doing deficient work, and that is almost invariably the liver, in the sense already explained.

The treatment, then, which I advise you to pursue is to employ such agents as will stimulate the excretory action by the *primæ viæ* without depressing vital power. No doubt that a powerful agent for the purpose is mercury; and it is quite unquestionable that relief of the symptoms above alluded to is to be obtained in a remarkable manner by occasional small doses of that drug. For our purpose, however, it is neither so successful in

action, nor can it be considered so harmless, as another class of agents, I mean certain kinds of natural mineral waters. These I also regard as greatly superior, in these maladies, to taraxacum, nitric acid, alkalies, and the other substitutes, as they have been termed, for mercurial remedies, in promoting the function of the liver. The mineral waters which I refer to belong to a group of springs all containing sulphate of soda, and some of them sulphate of magnesia also, in solution. In studying these waters, I wish you to look with me at the composition of them, and at the same time to dismiss from your mind entirely those views of medicinal doses which you have acquired in the dispensary, and which necessarily belong to it, since small quantities of drugs, as they exist in mineral waters, will act more freely than will those quantities combined after the ordinary pharmaceutical method. You ask me for a demonstration, and I am quite ready to give it you. At the same time, let me caution you against regarding the small doses of mineral waters as having any affinity, either in the matter of quantity or by manner of administra-

tion, with what is understood as “infinitesimal” doses. Thus, for example, you know that you may give A an ounce of salts, or B half an ounce, and you purge them ; but you may obtain the same effect with one-fifth of those quantities if you give it as prepared in Nature’s laboratory in the form of mineral water. It is a curious fact, which I give as an ultimate one, and without speculating here on the cause of the difference. As a proof of the superior force of the saline combinations found in natural springs, I may refer you to the following experiment. If you will reduce by careful evaporation, as I have done, such mineral waters to their pharmaceutical condition of crystallized salts, you will find them possessing little, if any more, power than similar salts as obtained by the ordinary processes, and met with in every chemist’s shop. They no longer do their work on the same terms as when administered in the original water before they were separated by evaporation. You will therefore readily understand how essential to our end it is to employ the natural mineral waters ;

since what are called "artificial waters," however admirably prepared, are simply pharmaceutical products, and are destitute of the very quality which distinguishes the remedies they are designed to imitate.

Here is a table of the waters which I refer to, with a comparative synopsis of their distinguishing saline contents, representing the number of grains (without chloride of sodium and other less active agents which are also present) in an English pint. Below these I add two well-known alkaline waters.

| — | Sulphate of Soda. | Sulphate of Magnesia. | Carbonate of Soda. | Other Ingre- dients. |
|---------------------|-------------------------|-----------------------------|--------------------------|----------------------------|
| <i>Saline :</i> | | | | |
| Püllna | 154 grs. | 116 grs. | — | |
| Friedrichshalle . | 58 „ | 49 „ | — | { Little iron. |
| Marienbad (Kreuz) | 48 „ | — | 9 grs. | |
| Carlsbad (Sprudel) | 25 „ | — | 13 „ | { Little iron. |
| Franzensbad . . | 30 „ | — | 6 „ | |
| <i>Alkaline :</i> | | | | |
| Vichy (Celestins) } | 3 „ | — | 47 „ | { Little iron. |
| about . . . } | | | | |
| Vals (Magde- } | — | — | 65 „ | { Little iron. |
| leine) about . } | | | | |

The most powerful water of the saline group is that of Püllna, which contains 154 grains, or nearly $2\frac{1}{2}$ drachms, of sulphate of soda to the English pint, and nearly 2 drachms of sulphate of magnesia. Those quantities would give a tolerably efficient purge to anybody. But you must not give a pint of Püllna; 5 ounces would be a full dose. I do not like Püllna generally for our purpose, because it purges too freely, often gripes, and is very nauseous. Half a drachm of sulphate of soda and half a drachm of sulphate of magnesia in this form is too much for many people. I therefore much prefer Friedrichshalle, which contains not a drachm of sulphate of soda in a pint, and little more than three-quarters of a drachm of sulphate of magnesia. Nevertheless, you would not think of giving a pint; eight or nine ounces make an efficient purge; for many persons six or seven suffice. I think I may say that seven ounces is an ordinary average dose, and it should be warmed and diluted too, adding, say a third or a half of its bulk of hot plain water. If you take seven ounces of

Friedrichshalle water in the early morning, say an hour before breakfast-time, then after the cup or two of hot fluid usually taken at that meal, you will probably have a full, free action of the bowels; perhaps two. That, you see, would be about twenty-five grains of sulphate of soda and twenty grains of sulphate of magnesia, which, taken in any combination you like out of a druggist's drawer, would have no appreciable action; you might be a little uncomfortable perhaps, but there would be no action of the bowels. To repeat what I have said: if you evaporate a quantity of Friedrichshalle water in a warm water bath so as to avoid decomposition of the salt, or even loss of the water of crystallization, and so obtain as perfect a product as a chemist can produce, and administer four times as much of this salt as that which exists in a dose of the natural water, you would still not have such efficient or certain results as the small quantity contained in the natural water will give you. So that there is something, which I do not pretend to explain, and certainly shall not speculate

about here, which distinguishes the action of mineral waters from the action of salts which are produced pharmaceutically.

The next water on my list is Marienbad, which contains no sulphate of magnesia, forty-eight grains of sulphate of soda in the pint, with nine grains of carbonate of soda, and a small quantity of iron. With these constituents, there is enough free carbonic acid to make it an agreeable and slightly sparkling draught. Rather more than half a pint produces for most persons an easy motion. If this water is exposed to the air for a day or two, there will be an obvious brown deposit of the iron, and it may be regarded as slightly ferruginous, although that is a secondary character.

The next is Carlsbad, with its many springs, all of which contain about twenty grains of sulphate of soda and thirteen of carbonate of soda in the pint ; and differ from each other only in the temperature ; which is always very high when it issues from the source. Carlsbad water is often supposed to be purgative, but is

not so unless taken very largely. No quantity ever given here exerts a laxative action on the bowels. The influence it exercises on the animal economy, although probably chiefly due to the sulphate of soda element, is not in any way as an aperient.

Then we come to Franzensbad, which contains thirty grains of sulphate of soda, six of carbonate, and a little iron, which Carlsbad does not. That closes this group of springs.

But now I shall just point out the distinctive characters of the alkaline waters which are so popular in this country. First, Vichy, which contains only three grains of sulphate of soda, but nearly fifty grains of carbonate of soda, in the pint—a powerful solution. Then we come to Vals, which is also from the volcanic district of France, some of the springs of which contain upwards of sixty grains of carbonate of soda, and nothing else worth mentioning. These two waters are extremely famous, and are much resorted to against gout and gravel. Under their use the uric-acid deposits disappear—that is, they are dissolved by the alkali. Inasmuch

also as this appears to have some beneficial action on the liver, a certain degree of permanent benefit is perhaps also attained. Thus such patients are often better for a time after a visit to Vichy; but, as a rule, are not permanently benefited. I am satisfied, after observation on the spot, and on the effect of the waters here, that they only temporarily mitigate the complaint, and do not cure it. Now the principle upon which the waters of Friedrichshalle and Carlsbad are beneficial is, that they produce activity in all the digestive functions, and thus waste matters which have been hitherto thrown out as uric acid by the kidney are eliminated in some other form. And thus it is that, if it be necessary to send these patients abroad, I prefer very much Carlsbad to Vichy, provided always that the subject of a Carlsbad course must not have become too weak, as for a time it makes a demand on the strength not well supported by a feeble person. Generally, however, this is not at all the condition of those who are passing uric-acid gravel. Happily, also, for most people our purpose can be

attained as well at home. I believe that a short course of Friedrichshalle water first, followed by that of Carlsbad, or by a combination of the two, produces the best results in these cases. This method has, at all events, been more successful with me than any other. Such a course should be continued, according to circumstances, for six or eight weeks.

A few words upon the way in which you should give these agents. If you have a patient coming to you whose digestion is not good, complaining of foul tongue, with deranged stomach and loss of appetite, it is sometimes, not always, desirable to give first a single dose, no more, say three or four grains, of blue pill at night, and the next morning eight or ten ounces of Friedrichshalle water, so as to insure a free action of the bowels. Then commence the course with Friedrichshalle, alone, say five or six ounces, combined with three ounces of hot water, every morning an hour before breakfast, diminishing a little the quantity of mineral water every day or every few days. And as you

do so, three or four ounces of Carlsbad water may be added, taken together with the hot water from the same tumbler. One of the characteristics of Friedrichshalle is, that the longer it is taken the smaller is the quantity necessary to effect the purpose. If, for example, seven or eight ounces taken in the morning, say with five ounces of hot water, produce one active movement of the bowels immediately after breakfast, the next morning six or seven ounces will do the same, and the morning after probably five or six ounces; and it is very likely that at the end of three weeks the patient will from four ounces experience the same effect produced originally by seven or eight. But after you have given it thus for a week or so, according to the nature of the case and the results, you should combine it with Carlsbad, say three or four ounces of the former and six or seven of the latter, with three or four of hot water every morning. When Friedrichshalle is given alone, and also when it is mixed with Carlsbad, 20 or 30 per cent. of hot water should be added,

that it may resemble somewhat the natural condition of the spring. Friedrichshalle is naturally hot, and is evaporated on the spot to a small extent, being regulated and rendered uniform by stopping the process when the water reaches a certain specific gravity; 1.022 at $54\frac{1}{2}^{\circ}$ Fahr. After giving this combination of the two waters for two or three weeks, seven or eight ounces of Carlsbad may be taken alone for another fortnight or more; and if the bowels do not act fairly, one or two ounces of Friedrichshalle may still be added. Carlsbad, which at the spring is too hot to drink until cooled, should, when taken alone and unmixed, be raised in temperature to 90 or 100, by placing the tumbler containing it in a vessel of hot water for a few minutes. The quantities given are considerably less than those administered at the spa itself, where a patient's stay is necessarily limited as to time. I am quite satisfied that the smaller quantity here recommended, and employed during six or nine weeks, instead of the usual three weeks of a foreign course, is

better for a majority of the patients we have to deal with. The same quantity of water given there in twenty-one days, producing often notable loss of weight and power, will, if given here in fifty or sixty days, attain the object as certainly and more safely. I by no means dispute that there are other cases which may be benefited by the more heroic plan adopted on the spot. I have largely and systematically employed these agents now for ten or twelve years, modifying the quantity and the mode as experience has indicated, and the system thus briefly described is the result of it. The course may be repeated with advantage, if necessary, for many patients after an interval of three or four months. Meantime, as an occasional aperient and a corrector of digestion for these patients, I know nothing at all equal to Friedrichshalle. It leaves the patient as a rule less constipated after discontinuing it than he was before ; and, as already said, may be taken habitually without lowering the system. I have known patients continuing its daily use for three or four years,

but I do not advise this course unless in exceptional cases. Nevertheless, I know a gentleman, nearly eighty years old, who has taken it for five years regularly, a wineglass every morning, and the effect has been for him most admirable. Suffering much formerly from an obstinate constipation, he enjoys perfect regularity and excellent health. Let me say here that what is called "Carlsbad salt" is often used for the same purpose, and is taken also in the belief that it represents Carlsbad water. This it does not do, since it consists almost entirely of sulphate of soda taken from the water, together with a little of the carbonate, and has the same and no more virtue than such a salt obtained from any other source. No doubt that the sulphate of soda, known also as "Glauber's salt," is one of the most admirable medicines we possess, and deserves to be more popular than it is. I constantly ordered it, with or without a small addition of sulphate of magnesia, for the outpatients, as the best substitute within my reach for the mineral waters in question.

In the few minutes which remain, I will advert briefly to the subject of diet, certain restrictions in which are extremely important. It used to be said that when uric acid is largely deposited the nitrogenous elements of the food should be considerably diminished. I do not find in practice that a strict application of this rule is advantageous. On the contrary, diminution of the deposit is more certainly attained by a course which is almost the opposite of that. There are three classes of aliments which must be permitted to the patient very sparingly, in order to attain the end in view—viz., alcohol, saccharine, and fatty matters. First, alcohol : any fermented liquor permitted as an article of diet should be selected in its more diluted and in its most pure form. No doubt for most patients, the best course is to relinquish altogether the habit of taking it. That it is not only not essential to the health of most persons, but is absolutely prejudicial to most, I am firmly convinced ; but especially, however, to the “torpid liver” is it deleterious. No doubt, after long experience of the use of

wine and beer, total abstinence at first entails no little hardship on some persons. They feel keenly for two or three months, or even more, the loss of their customary stimulus. In most instances, however, when this term has been passed, they are better, stronger, and no longer want any alcoholic liquor. But if the sacrifice is too great ; or if there is a reason to believe that it is desirable, at all events while commencing the course of waters, not to make so great a change, and that is I think the preferable course, I advise that form of alcohol which exists in light natural wines as the best, such as a light sound Bordeaux or Rhine wine of similar quality, the former perhaps agreeing better with most persons here. You will forbid champagne, as for the most part imperfectly constituted, and always bad if containing much of the sweet compound often largely added and known as "liqueur." The stronger wines, as sherry and port, are most unsuitable, and strong beer is to be absolutely forbidden. Solutions of pure spirit and water may be exceptionally desirable for some few persons

with weak digestion. Secondly, sugar in all its forms, at every meal and wherever met with, forbid it altogether. Of the undesirable effect of saccharine matters in these cases I have a large experience. Thirdly, let fatty matters, butter, cream, and the fat of meat, whether simply cooked or in combination to form pastry, be taken very sparingly.

I cannot enlarge on the theory on which the foregoing advice is given. Suffice it to say that abstinence from the substances named probably lightens considerably the work of the liver, and so lessens the vicarious labour of the kidneys in accordance with the views already propounded. Let me just advert, however, to the dietetic system at Carlsbad. In recognition of some such principle there, no doubt, the use of sugar and of butter is absolutely forbidden during a Carlsbad course; and were you patients there, your purveyor would not supply you with the forbidden food, however much you might demand it. I can only say, as the result of observation, that this system, much more than the elimination of meat from

the dietary, will reduce the uric-acid deposit. If you will cut off a portion of alcoholic stimulant when necessary, and it mostly is so, while in some cases, as we have seen, you may certainly with advantage forbid it altogether; if you will forbid everything that contains sugar, and diminish considerably all fatty matter—giving nitrogenous food in fact, and diminishing greatly hydrocarbons—you will generally accomplish more than by the contrary method. One class of food, neglected by most people, is particularly to be recommended here: I mean fresh green vegetables, for the most part cooked, of all descriptions. A sufficient quantity should be taken, at two meals in the day, to form an important portion of the daily nutriment. Apples also, baked or stewed, without sugar, may be taken also, but not fruits containing much sugar—as grapes, pears, and plums. With many, a light salad will agree, and if so, is quite admissible. Besides attending thus to diet, you will of course direct that the patient takes daily a fair amount of exercise in the open air, and that he protects

his skin and encourages the performance of its functions by habitual ablutions and sufficient clothing. These points I can only name; but they are essential concomitants to the rest.

Well, then, it is this system of diet and regimen, and the occasional systematic employment of the mineral waters named, which mainly constitute the treatment I strongly advise for the purpose of checking calculous disease in its early stages, and so to prevent the formation of stone in the bladder in that considerable majority of cases which are due to uric-acid formation and its consequences.

LECTURE II.

ON THE TREATMENT OF STONE IN THE BLADDER
BY SOLVENTS : ITS HISTORY AND PRACTICE.

GENTLEMEN,—The inquiry as to whether it be possible to dissolve stone in the bladder by medicinal agents, and so to avoid any operative proceedings for its removal, is one which is evidently exciting a good deal of interest at the present moment. During how many centuries has this question appeared and reappeared ! Some accident calls public attention to it ; much is written and said ; little is done, and less is realized, in relation to this most desirable object ; after which a cycle of indifference follows. Meantime, as the sum of these reiterated efforts, some sort of progress results. Nevertheless the subject is scarcely considered in standard surgical works, although it is one fraught with interest to us all. For myself, I confess, it has always had a degree of fascination. It would be so great

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a triumph to our art to dissolve the stone without damage to the delicate structures in which it arises and finds its residence. And thus it is that I have not only alluded to it in various works, but have discussed it at considerable length many years ago in one of them.*

I propose therefore to tell you what has been done, and what at present appears to be attainable by the agents employed ; in short, to sketch the history of solvents for stone in the bladder from the earliest period to the present day.

You know that the existence of calculus was recognised, and that a cutting operation for its removal, at all events in the cases of boys, was practised, a few centuries before the Christian era. In course of time the attempt was made to dissolve it, especially in the case of adults. It appears that neither Hippocrates nor Galen entertained the belief that this was possible. One of the earliest allusions to the practice is

* "The Enlarged Prostate" (1858): last chapter.

found in Pliny, who says that "the ashes of burned snails' shells are good for expelling the stone." Aretæus (second century) recommends "quicklime in honeyed water" for the same purpose. Later authors, quoted by Paulus Ægineta (seventh century), speak confidently of the efficacy of goat's blood, and they observe that some solvents wrongly given increase the calculus.

Arriving at the period when medicine flourished in Arabia, we find numerous remedies and complicated combinations systematically given. The celebrated Avicenna (about the tenth century) enumerates many substances supposed to be efficacious. He and others of his time employed occasionally an impure carbonate of potash; but as an example of the kind of prescription current at this period, I give you one of them in full, translated from Avicenna, as it is a curiosity, and gives you a good idea of the very complicated mixture which constituted an ancient medicine:—
"Take equal parts of calcined glass, of the ashes of scorpions, of the ashes of the roots of

coleworth, of the ashes of a hare, of the ashes of egg-shells from which the chickens have escaped, of the stones found in the sponge, of goat's blood dried and powdered, of lapidis judaici; the same of parsley, wild carrots, marsh-mallow seeds, and gum arabic. Make it into an electuary with honey."*

Between this period and the fifteenth century we can mark no advance. About this time Basilius recommended the internal use of an alkaline salt, obtained from the cuttings of the vine in spring; this, on the authority of Boerhaave.† Crollius, in his *Basilica Chymica* (Frankfort 1608), recommended the patient to take a salt of tartar (carbonate of potash) in an infusion of parsley, and also some solutions of which lime was the principal ingredient. In 1650 Daniel Sennertus directs the internal use of the same remedies, and also that they should be injected into the bladder through a catheter. About the same time, Riverius, physician to the

* "Avicenna," lib. iii. fen. xviii. trac. i. c. xix.

† "Elem. Chimiæ," 1732, vol. ii. p. 73.

French Court, advises, as many others also did, the ashes of calcined egg-shells. The dose was a drachm of the powder, which was of course chiefly lime, to be given in white wine or with diluents twice a day; and it is stated that “potenter expellit calculum in urinæ meatibus hærentem.”* Numerous other authorities might be quoted as repeating all these receipts with little or no variation.

Next in order comes, in this country, the famous Mrs. Joanna Stephens. This lady had acquired so great a reputation in the earlier part of the last century, that in 1739 the English Parliament, after a formal inquiry, purchased her secret for dissolving the stone at the cost of 5000*l*.—a circumstance which produced a large and remarkable literature during the next few years, and gave a great stimulus to research. The document, which was obtained at this cost, commences thus :—

“My medicines are a powder, a decoction, and pills. The powder consists of egg-shells

* “Riverius Praxis Medica,” Lugd., 1657, p. 381.

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and snails, both calcined. The decoction is made by boiling some herbs (together with a ball which consists of soap, swine's cresses burnt to blackness, and honey) in water. The pills consist of snails calcined, wild carrot-seeds, burdock-seeds, ashen keyes, hips and hawes, all burnt to blackness, soap, and honey.”*

The quantity given was a drachm of the powder three times a day, mixed in cider or other liquor, and followed by half a pint of the decoction. If the decoction disagreed with the stomach, the pills were to be substituted. These compounds were found to be very nauseous, and were superseded by other agents.

After this, Dr. Whytt, Professor of Medicine in the University of Edinburgh (1761), brought soap and lime-water into favour, giving one ounce of “Alicant soap” and three pints of lime-water daily, and illustrating its use by a remarkable case or two.

In the hands of Blackrie (1766), Chittick—

* *Gentleman's Magazine*, June, 1739, vol. ix. p. 298.

who made all his patients send locked cans of veal broth daily to his house that he might add the solvent and preserve his secret,—and others, mixed solutions of potash and lime were much employed; and a considerable amount of evidence of their utility to allay pain was published on good authority. Soap leys of different strengths furnished the potash in many cases; in others the “salt of tartar” was given, and always in a very diluted form.

In France at an early date alkaline remedies had many advocates, such as Darcet (1726)* and Pierre Desault (1736). Morand, the famous surgeon of Paris, who came to London to report to the French Academy on Cheselden’s operation of lithotomy, made also very careful observations on forty patients treated by Mrs. Stephens’s remedies. He was unable to certify to a single case of removal by the solvent, but said that four “thought themselves cured.” Much later the subject of alkaline solvents was investigated by Fourcroy and

* “*Annales de Chimie.*” Paris.

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Vanquelin ; more recently by C. Petit (1834). The first and last named employed the Vichy waters. In Italy Girardi (1764) recommended the use of solvents, but extolled especially the virtues of a decoction of *uva ursi* for that purpose.

Meantime the vegetable kingdom had been largely explored for the same purpose. It will suffice to give a list of a few of the principal plants so employed during the last two or three centuries. I shall name those only which enjoyed the greatest favour. The "*Banke cress*," or "*saxifrage*" (hence the name): its seeds boiled in decoction of couch grass; dose of the seeds one drachm. Tincture of the "*Pimpinella saxafraga*." A tincture of the seeds of the "*Lithospermum majus*," or "*great gromell*." The decoction of "*Broome*;" a tincture of the seeds of "*Fraxinella*." Tincture of the root of the "*Raphanus sativus*," or garden radish. Tincture of the seeds of the common nettle. The marsh and yellow mallows, the couch grass, parsley, and the wild carrot were also ingre-

dients in the compound decoctions employed.

And now I come to the experience of to-day. And I suppose you to inquire, What are the existing resources available for a patient who desires at the present time to attempt the solution of a stone in his bladder?

I shall divide these into two classes. First, there are the empirical remedies, which have a certain reputation; and secondly, there is the result of the latest investigation of the subject by scientific observers.

First, the empirical remedies. It is a curious fact that in almost every European country there exist certain persons who obtain a livelihood by making and selling remedies to dissolve the stone. The recipes employed are usually family heirlooms, and a sort of reputation clings to the family, each generation of which carefully preserves the secret, such as it is, and the traditions of their predecessors. In the same way the art of bone-setting, as you no doubt know, is associated with certain names and localities; an art the

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nature of which was so well discussed and appreciated by Sir James Paget in one of his admirable clinical lectures about five years ago. The solutions—for they usually take that form now—are sold in this country under the name of “constitution water,” or some similar term; and they are moreover guaranteed to be useful in all forms of urinary disease.

Peculiar circumstances have given me large opportunities of observing and examining these agents. I have met with them here and in different parts of France. I well remember an old Frenchwoman and her son journeying on foot from the south of France to Brussels, about ten years ago, laden with a basket of heavy bottles filled with the family nostrum for a royal patient there. I may add, that her devotion was considerably rewarded. Such unsolicited contributions, either material, as in this case, or by way of suggestion, of every conceivable kind, flowed in then from every part of Europe; and such is always the case in similar circumstances.

I may here tell you that I have recently

received numerous communications on this subject from known and unknown correspondents, urging on me the value of the recipes which belong to the writers. I shall select two which widely differ for mention here, each possessing interest of its own kind. One was from a French gentleman, who gives me his name, and offers an infallible cure, which of course he does not describe, but consents to communicate it for the moderate sum of a million of francs (40,000*l.* sterling) ; and I do not hesitate to say it would be well worth the cost if it could accomplish the wonderful results alleged to be within its power. The other is from an English labourer in Bedfordshire, who wishes me to know what cured his friend some time ago in the neighbouring parish. He freely gives me the formula, and it is a fair specimen of a good country recipe for the purpose, for I have seen many such, and it has some interest for us, as we shall see hereafter. I could not help writing my thanks to this man in reply, and was at some trouble to explain why his remedy might be

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good in some cases, and why it might be prejudicial in others. Here it is in his own words: "Get a peck of wood-ashes, and pour on them a gallon of boiling water; let it stand twenty-four hours: then strain it off as clear as possible, and take a wineglassful every morning, fasting." This is a large dose of carbonate of potash; our old friend the alkali, you see, always recurring. I had the curiosity to determine the quantity. A ley of wood-ashes thus made from pine-wood furnishes a solution of fifty grains of the carbonate to the ounce, so that the quantity taken at once was at least a drachm and a half or two drachms. The other soluble constituents of the ley are sulphate and silicate of potash and chloride of potassium.

Now as to the more pretentious compounds which are sold in this country as solvents, I have submitted the chief to careful chemical analysis, and I intend to present you with the result. Not that I had any doubt as to what their general characters and composition were, nor of the fact that they were all nearly alike

in their composition. But I wish you to have an exact statement founded on analysis. A recent examination of a well-known and typical one in some repute in this country, two bottles of which are placed before you, and which you may have for your own analysis if you please, is a simple undisguised solution of bicarbonate of potash in water. You see that they are ordinary wine-bottles, the old "wine-quart;" each contains about an ounce of bicarbonate of potash and fifteen grains of chloride of sodium—the latter possibly due to the spring water of which the solution is made. Half the bottle, which is equivalent to four drachms, is directed to be taken daily.

At this point, let us make a rapid survey of this long and curious history of man's painful, slow, and somewhat clumsy efforts to rid himself by medicine of his terrible enemy the stone. Observe that the agents have always been alkaline. At first, and chiefly, the alkaline earth, lime: you mark it as the agent in the calcined snail-shells of Pliny and the egg-shells of Avicenna, which do but reappear

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in that expensive prescription of Mrs. Stephens in 1739 ; but in Avicenna's time it was combined with potash, the representative alkali of the vegetable kingdom, as you see in the quantity of burned plants which enter into the composition ; and Mrs. Stephens, probably without knowing it, employed also potash and soda in her addition of soap and calcined weeds and seeds to the egg-shells. Then lime-water and soap came next into fashion, giving a combination of the three alkaline agents named. And the popular remedy of to-day before you, sold at many shillings a bottle, and of which a large quantity is ordered to be taken daily for three months, as the minimum dose and time, is, as you have just seen, a simple solution of bicarbonate of potash in water ; and the cost of it is actually less than the bottle and the cork which enclose it ! Our country labourer's nostrum is nearly as good in form, has precisely the same solvent power, and is almost absolutely without cost.

Then there is another popular remedy—namely, Vichy water, which is so largely em-

ployed by patients with urinary maladies, and which in its time has been vaunted for its solvent powers on the ground that it consists mainly of a strong solution of carbonate of soda, the alkali of the mineral kingdom.

We are now in a position to arrive at the following conclusion, the only one possible—viz., that all the quack and would-be secret medicines employed from time immemorial to the present day are solutions of either lime, soda, or potash, alone or combined. All the plants, after combustion, furnish alike only one and the same active agent—viz., potash; all shells, whether of eggs or of marine and land animals, furnish alike only one and the same active agent—viz., lime.

Lastly, the medicinal remedies employed by the faculty everywhere, at the present day, are hydrate of potash, in the form of liquor potassæ; the bicarbonate, the citrate, the acetate, and the tartrate of potash. After them, and less generally employed, are soda and lithia in different forms.

Now, before entering on any consideration

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of the applicability of all these agents as solvents, from a scientific and not from an empirical point of view, it is necessary to examine briefly the substances they are designed to act upon—namely, the stones in the kidney or the bladder which it is desired to dissolve. And the first fact that must strike you at the outset is, that these calculi are of different kinds; some having characters diametrically opposite to those of another kind. And the question naturally arises, is it possible that one form of remedy—namely, the alkaline agent—can be adapted to dissolve calculi whose composition is so varied?

I shall remind you of those general terms which I used in a recent lecture on that subject to classify the varieties of urinary calculi. Three-fifths of all the calculi met with among adults of all ages are composed of uric acid and the urates; nearly two-fifths are phosphatic, and about 3 or 4 per cent. are oxalate of lime. Cystine is too rare to be admitted to our reckoning. Three-fifths at least then are the products of a urine abounding in acid, of which

excess they are the expression. The remaining two-fifths are the product of urine generally alkaline, mostly ammoniacal, of which condition they are the result. The urates, the oxalates, and a very few of the phosphates, are found in the kidney, and are the product of certain constitutional derangements; the greater part of the phosphatic material, whether in mixed or in phosphatic stones, is produced solely in the bladder, and is the product, not of a constitutional state, but of local disease there. Now, uric acid we know by experiments conducted out of the body, to be easily soluble in alkaline solutions, but some of these have a more energetic solvent action than others; and the resulting salts vary in solubility. Thus, urate of lime is a rather soluble salt. Urate of soda is less so, and in this form enters into the composition of some calculi. Urate of potash is more soluble than either of them. Potash is the most powerful agent that can be employed on a uric-acid calculus, among those materials which can be taken internally for a long period of time with comparative impunity.

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These facts, then, indicate it as the most desirable solvent to employ under certain conditions, hereafter to be described, and as such it has long been regarded. Nearly twenty years ago I called attention to its pre-eminence for this purpose, stating that the "citrates and carbonates of potash are more potent and certain than Vichy water" for the treatment of "uric acid in the form of gravel," and that they should be given largely diluted, pure water itself being one of the best solvents.* I may add, that I have never at any time prescribed Vichy water for any urinary affection, and on the ground of its inferiority to the potash solutions. I think the citrate of potash may be fairly said to be the salt which of all others offers the best chance of success; and this by common consent of all who have examined the subject. If, however, it exerts too much diuretic action, as in some cases it seems to do, the next best may be employed—namely, the bicarbonate.

* *The Lancet*, 1854, vol. i. p. 439.

A question of great interest comes before us here—Has citrate of potash been fairly tried on stone in the bladder by a competent observer? I am happy in being able to answer this question in the affirmative. An accomplished physician, Dr. Roberts of Manchester, formerly a distinguished pupil of this school, has made carefully conducted experiments on calculi in and out of the bladder with certain results. I give you the following brief analysis of them.

Dr. Roberts finds carbonate of potash to be the most powerful solvent: better than soda, much better than lithia. The solution must not be too strong, otherwise an alkaline biurate coats the calculus and solution is checked. The best salts to administer by mouth are the citrate and the acetate, these, as you know, becoming carbonates in the urine. The adult dose should be forty or fifty grains in three or four ounces of water every three hours—equalling six drachms daily. The urine thus rendered alkaline may become cloudy from amorphous phosphates, but this state does not

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hinder solution, provided the urine is not also ammoniacal; but if it becomes so, it is most important to bear in mind that all solution then absolutely ceases. Hence it is useless to attempt the solution of a uric-acid stone unless the urine is naturally acid. If the urine is alkaline before commencement it is certainly ammoniacal, and no solvent will act, as mixed phosphates are deposited on the surface of the stone. He admits that it is quite useless to attempt the solution of a large calculus of any kind, or of an oxalate-of-lime calculus; and that nothing can be done with a phosphatic calculus except by injection into the bladder. Lastly, he states, alkaline injections of the bladder for uric-acid calculus are without efficacy. To resume: the following conditions are essential to success; certainty that the stone is of uric acid, and that it is of small size; that the urine is acid, and never ammoniacal. These extremely favourable conditions existing, the most powerful solvent known—potash—offers a fair chance of diminishing its volume considerably after a trial of several

weeks, so that the nucleus may perhaps be passed by the urethra; but at present Dr. Roberts is not able to report so complete a success.*

There, that is the best thing that modern science has yet done towards accomplishing the dissolution of the stone. Then you say, Have there been no results whatever from the empirical methods you have described? Have miserable calculous patients for two thousand years been swallowing to no purpose all the nauseous mixtures described, from Pliny to Joanna Stephens, and onwards through Chittick, with his locked cans, to the nostrum dealers of our own time? I wish to give you a fair and distinct answer to that question, and will do so as far as it is in my power.

I reply, first, that there is very slender evidence as to the complete solution of a stone in the bladder by any alkaline agent. I cannot find that any patient, certified to have stone after sounding by a competent surgeon

* "Practical Treatise on Urinary and Renal Diseases." 1872.

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has, after a course of any solvent, been again sounded, or submitted to autopsy, and demonstrated to be free from stone. Less evidence than this is quite valueless. That the alkaline solutions often greatly palliate some cases, and enable some patients, but by no means all, to continue in comparative comfort without extraction by any method, I have always been perfectly satisfied. I have seen some remarkable examples of their influence among those aged and very infirm persons whom it would be impossible to submit to any cutting operation, and whose calculi are not within the limits of lithotrity. Such have sometimes been enabled to spend the remainder of their lives with little or no suffering, provided that they were also enabled to maintain a condition of repose and freedom from movement. Sometimes, on the other hand, the freedom from pain which they produce is temporary only; and in some cases, as I have not seldom seen, the effect of alkaline agents is to produce considerable aggravation of the symptoms. This was often observed during the

“soap and lime-water” period. The degree of palliative influence, however, is not the subject before us, but the question of complete solution of the stone. Morand’s cases, already referred to, of which twenty-two were sounded before taking the medicine, did not supply a proved example of success. Among the alleged triumphs of the lime and potash treatment, many after death were examined and found to have stones still, often numerous and large, in the bladder.* But what is more to the point is, that the four persons whose cures were certified by the trustees appointed by the Government to examine into the merits of Mrs. Stephens’s remedies, died each one of them with stone in the bladder, where it was found by post-mortem examination.†

The case of Horace Walpole in the last

* Dr. James Parsons reports twelve post-mortems of Mrs. Stephens’s patients who, dying, were found in that condition. “A Description,” &c. London, 1742.

† Alston’s Lectures in the “Materia Medica,” vol. i. p. 268. London, 1778. Their names were Gardiner, Appleton, Norris, and Brighty.

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century is well known; it was written by himself for the Royal Society. He commenced—being nearly seventy years of age—to take from half an ounce to an ounce of Alicant soap and three pints of lime-water daily for many months at a time, and with short intervals up to the period of his death at seventy-eight. He experienced great relief after taking them for a year or so, and ultimately believed himself to be cured. At his death three smallish calculi were found in his bladder. The case naturally attracted much interest at the time, and is one of the best results on record.

But there is another curious fact in connexion with this matter, which is, that the great majority of patients who took these medicines then and who take such now, are not the subjects of stone at all. They have some symptoms which resemble what they are pleased to consider calculous symptoms, and they take large doses of alkali—notoriously one of our best remedies for urinary irritations—and obtain relief. They then tell their neighbours,

and often certify in print, that they have been cured of that "dangerous malady the stone." These are the great cures which the nostrum-mongers rely upon. For what happens to those few of their clients who really have stone? Two things may happen: first, that the stone, if uric acid, becomes coated, as Dr. Roberts has described, with the biurate, which either adheres or comes away in scales; or secondly, the urine will become ammoniacal; and thus in either case no dissolution whatever can occur. During the time, however, large quantities of white sediment composed of the earthy phosphates or of shell-like fragments of the biurate, to say nothing of the white granular deposit of the mixed phosphates, come away; all which the poor patient believes to be the débris of his stone and the proof of the efficacy of the solvent process! This fact exists in the great majority of cases, and is always appealed to as an infallible sign of the value of the agent! Meantime the stone is acquiring, not slowly, fresh layers of deposit, and is becoming surely larger. Such must

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often be the inevitable result where the medicines are empirically given—that is, without reference to the nature of the stone and the condition of the urine, and where the procedure cannot be watched and regulated on the principles laid down above. But, say you, this is a mere *à priori* statement, and looks very plausible, no doubt; but how do you know that this happens? I will give you one instance which will suffice, and can give more if required. A few years ago a man came to me from Yorkshire, who, having had symptoms of stone for a considerable time, was advised to take some well-known solvent for his malady. Accordingly he did so, and you will agree with me probably that he took enough to insure it a fair trial, for he swallowed twenty-five pounds' worth of that very water which you see before you on the table. He was relieved, but his life was necessarily an active one, and he had not the means of repose and the luxurious surroundings which Horace Walpole had, and his stone symptoms ultimately got worse. At last he came to me, and I crushed for him a

large mixed calculus. Had he come to me before, it would have been a smaller one. The case did well, and the man lives at this day to tell the tale, and, if necessary, he is ready to tell it again.

Now mind, I do not say that a calculus has never been dissolved, nor that it is impossible to dissolve a small uric-acid calculus by alkaline agents taken internally. I will go further, and express my belief that, given abundance of time and careful supervision, it may be possible. Nay, I will do more; the first case of such a kind that comes into the hospital, the patient consenting, I shall be pleased to submit to the process, and to give it a fair trial. But this I say with certainty, that there is no evidence whatever that one case in a hundred of those who have swallowed solvents for the stone has been cured of it, during all past experience down to this day. No man who deliberately takes solvents for even a small calculus the characters of which have not been carefully determined, can reckon on any better chance than this—viz., that it is a hundred to one

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against their success, and that it is probable that his stone may grow bigger meantime. And if the stone be large, the solution is impossible.

What is the value of the treatment in question? It is impossible to say more than that it may be valuable, not for stone in the bladder, but for that earlier stage of the same malady—stone in the kidney. That is the period of its history in which to attack the stone by solvents. When small uric-acid calculi are passing periodically or occasionally, much may be done: first, and I believe mainly, by preventive treatment, on principles I have already explained to you in a lecture devoted entirely to that subject; and that being insufficient alone, secondly, by alkaline treatment. With these two together, there ought in time rarely to be much trouble with stone in the bladder. I confidently anticipate a future in which any severe operation for it will be rare. Uric-acid stones only, as you know, are amenable to the process by solution, and happily, they form the very large majority of renal calculi.

I must say a few words about agents to be used locally in the bladder for the solution of phosphatic stones, which are not dissolved, but rather increased by the internal remedies already described. This is a matter, one may say, almost of daily practice. You know that there are many patients, chiefly those who are unable to empty the bladder except by catheter, who are very prone to form calculous matter of the mixed phosphates, and this at a very rapid rate. For these persons acid solutions injected into the bladder are very valuable. The patient may be taught to do it himself; numbers have been taught in my wards. Once or twice a day, after withdrawing all the urine by catheter, he applies to the end of it a four-ounce bottle, with stopcock, containing a solution of acetate of lead, about one-third or one-half a grain to the ounce of distilled water, or of one, two, or three minims of dilute hydrochloric acid to the ounce. He throws in half the contents, and allows it to issue, carrying out with it some small débris perhaps. He next injects the second half, and allows it to remain there.

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This does much to prevent the formation of phosphatic calculus, or, at all events, of the aggregation of its elements in the bladder. I have no time to describe the considerable extensions of this process in the matter of quantity, &c., which are possible when more than this has to be achieved. The principle is the same, and the extension of it is easy ; and I have elsewhere gone into detail in this matter.

I must not omit to name the agency of electricity which has also been locally employed, both for uric-acid and for phosphatic stones. Prevost and Dumas (1823) attempted direct solution of a stone in the bladder by the galvanic current, a plan which was more fully developed here by Dr. Bence Jones (1852). The amount of instrumental manipulation, however, necessary to bring the wires into contact with the stone and to maintain them there during the period necessary for its solution is considerably greater than that required to crush the stone by the modern method of lithotripsy, and must therefore be regarded at present as inapplicable.

And now comes the inevitable final conclusion, inevitable because true. It has been shown that there is no chance for the dissolution of any but a small stone, and this provided only that it exists in the most favourable circumstances : and lastly, that in order to accomplish the task a considerable period of time must be devoted to the process.

For such a stone, gentlemen, but one or two, rarely three sittings, by lithotrity are necessary. And, thus limited, no operation in the whole range of surgery is more certainly safe, rapid, and successful. I repeat the statement, that such a case I have never lost in the whole course of my experience. Nevertheless, let the patient's voice be heard in determining the course to be pursued. He claims the right to exercise a choice, although he may not always manifest his wisdom in doing so ; but it belongs to us to give him a full view of the relative merits of both methods. What they are I have endeavoured impartially to set before you.

THE END.

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